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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/649,013	08/28/2000	Yasukazu Nihei	Q58716	7581

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EXAMINER	
ANGEBRANNDT, MARTIN J	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 10/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/649,013	NIHEI ET AL.
	Examiner	Art Unit
	Martin J Angebranndt	1756

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *7/6/2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3,4,7-12 and 19-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3,4,7-12 and 19-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The response of the applicant has been read and given careful consideration. The arguments offered by the applicant are somewhat moot based upon the new rejection below.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 3,4,7-10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068 and Naya et al. '367.

Miyawaki et al. '750 teach the coating of a lithium niobate crystal with a positive photoresist, which is contact exposed with a comb electrode pattern is disclosed. After development, Al is deposited on the patterned resist and acetone used in the lift-off process to remove the resist and overlying aluminum to form the comb electrodes. (7/32-60). The examiner notes that contact exposure results in the near field exposure (14/19-15/3) as the pattern is in direct contact with the resist.

Byer et al. '221 teach the coating of a lithium niobate crystal with a positive photoresist, which is contact exposed with a comb electrode pattern is disclosed. After development, Cr is deposited on the patterned resist. (12/25-48). The formation of periods of 15.5 micron with 3.5 micron metal lines is disclosed. (10/54-57).

Kanarian et al. '068 state that the lithium niobate may be used as the waveguiding medium with NLO response. (3/44-52). The coating of the Al electrode materials on the

substrate, the overcoating of this with a photoresist and contact exposure of the resist with 405 nm light is disclosed. The resist pattern is then transferred to the aluminum by etching, followed by removal of the resist.

Naya et al. '367 teach bilayer resist processes for forming fine grating patterns, where the topmost resist is less than 100 nm thick (2/54-58) and the exposure is a near field exposure. The use of a prism to facilitate the near field exposure is disclosed with respect to figures 10 and 11. The use of fiber optics to perform the exposure is disclosed with respect to figure 12. The topmost resist may be diazides, diazo and silicon containing resists (3/11-20). The formation of grating patterns with periods of 200 nm or less is disclosed. (3/27-34). The resulting resist patterns have a high aspect ratio and can be formed at a low cost. (3/40-67). The two resist process where each resist is coated, a mask is contacted with the topmost resist and the resist exposed, the topmost resist is developed and used as an etch mask for the lower resist during an RIE etch, which etches the surface and then the resists are removed. (5/3-59).

It would have been obvious to one skilled in the art to modify the processes of either Miyawaki et al. '750 or Byer et al. '221 by using the metalization, resist processing and etching process taught by Kanarian et al. '068 for the same function with a reasonable expectation of achieving comparable results and further it would have been obvious to one skilled in the art to use a bilayer resist, such as that taught by Naya et al. '367 to form the fine periodic patterns which have high resolution and aspect ratios for a low cost.

4 Claims 3,4,7-10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068 and Naya et al. '996.

Naya et al. '996 teach bilayer resist processes for forming fine patterns, where the topmost resist is less than 100 nm thick (2/38-39) and the exposure is a near field exposure. The use of a prism to facilitate the near field exposure is disclosed with respect to figures 5 and 6. The use of fiber optics to perform the exposure is disclosed with respect to figure 7. The topmost resist may be diazides, diazo and silicon containing resists (3/11-20). The formation of patterns with linewidths of 100 nm or less is disclosed. (3/59-65). The resulting resist patterns have a high aspect ratio and can be formed at a low cost. (4/5-30). The two resist process where each resist is coated, a mask is contacted with the topmost resist and the resist exposed, the topmost resist is developed and used as an etch mask for the lower resist during an RIE etch, which etches the surface and then the resists are removed. (5/9-51).

It would have been obvious to one skilled in the art to modify the processes of either Miyawaki et al. '750 or Byer et al. '221 by using the metalization, resist processing and etching process taught by Kanarian et al. '068 for the same function with a reasonable expectation of achieving comparable results and further it would have been obvious to one skilled in the art to use a bilayer resist, such as that taught by Naya et al. '996 to form the fine periodic patterns which have high resolution and aspect ratios for a low cost.

The examiner notes that the arguments that the resists disclosed in the instant application would not be useful in semiconductors processes is undercut by the teachings of Naya et al. '996

5 Claims 3,4,7-11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068 and Naya et al. '367, further in view of Harada et al. '308.

Harada et al. '308 teach magnesium oxide doped lithium niobate with electrodes formed photolithographically to have a period of 4 microns. (example 1). The use of MgO-LN is recognized in the art as preferred, particularly due to higher damage threshold. (1/4-52)

It would have been obvious to one skilled in the art to modify the process of either Miyawaki et al. '750 or Byer et al. '221 alone or combined Kanarian et al. '068 and Naya et al. '367 by using the MgO doped lithium niobate as taught by Harada et al. '308 with a reasonable expectation of gaining the benefit of increased damage threshold in the resultant article.

The rejection stands for the same reasons as provided above, as no further arguments were directed at this rejection.

6 Claims 3,4,7-11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068 and Naya et al. '996, further in view of Harada et al. '308.

It would have been obvious to one skilled in the art to modify the process of either Miyawaki et al. '750 or Byer et al. '221 alone or combined Kanarian et al. '068 and Naya et al. '996 by using the MgO doped lithium niobate as taught by Harada et al. '308 with a reasonable expectation of gaining the benefit of increased damage threshold in the resultant article.

The rejection stands for the same reasons as provided above, as no further arguments were directed at this rejection.

7 Claims 3,4,7,8,11-12 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068 and Naya et al. '367, further in view of Harada et al. '308, Taguchi et al. JP 04-335620 and Yamanouchi et al. '197.

Taguchi et al. JP 04-335620 teaches periods of 1-30 microns and electrode widths of 0.5-15 microns. Periods of 10 and 2 microns are disclosed with lithium niobate materials. The electrode line width is the spacing between the electrodes as disclosed with respect to figure 1D as element 12a of the instant specification.

Yamanouchi et al. '197 teach in embodiment 3, the formation of electrodes with a pitch of 0.6 microns on a lithium niobate substrate using conventional lithographic processing.

In addition to the basis provided above, the examiner holds that it would have been obvious to modify the invention of Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068, Naya et al. '367 and Harada et al. '308 by using electrodes with spacings of less than 0.3 microns as taught by Taguchi et al. JP 04-335620 and Yamanouchi et al. '197 to render it useful with shorter wavelengths.

The rejection stands for the same reasons as provided above, as no further arguments were directed at this rejection.

8 Claims 3,4,7,8,11-12 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068 and Naya et al. '367, further in view of Harada et al. '308, Taguchi et al. JP 04-335620 and Yamanouchi et al. '197.

Taguchi et al. JP 04-335620 teaches periods of 1-30 microns and electrode widths of 0.5-15 microns. Periods of 10 and 2 microns are disclosed with lithium niobate materials. The electrode line width is the spacing between the electrodes as disclosed with respect to figure 1D as element 12a of the instant specification.

Yamanouchi et al. '197 teach in embodiment 3, the formation of electrodes with a pitch of 0.6 microns on a lithium niobate substrate using conventional lithographic processing.

In addition to the basis provided above, the examiner holds that it would have been obvious to modify the invention of Miyawaki et al. '750 or Byer et al. '221, in view of Kanarian et al. '068, Naya et al. '367 and Harada et al. '308 by using electrodes with spacings of less than 0.3 microns as taught by Taguchi et al. JP 04-335620 and Yamanouchi et al. '197 to render it useful with shorter wavelengths.

The rejection stands for the same reasons as provided above, as no further arguments were directed at this rejection.

9 The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10 Claims 4,7-10,19 and 21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-40 of U.S. Patent No. 6344367 in view of either Miyawaki et al. '750 or Byer et al. '221 combined with Kanarian et al. '068.

Claims 1-40 of U.S. Patent No. 6344367 describe the use of a bilayer resist to forma periodic grating pattern, where the two resist layers are formed, the uppermost being 100 nm or less in thickness (claim 3), the uppermost resist is exposed using various near field exposure devices to forma periodic grating pattern, the upper resist is developed and used as a mask to etch the lower resist and the underlying substrate. The examiner holds that it would have been obvious to one skilled in the art to modify the invention of claims 1-40 of U.S. Patent No. 6344367 by using the process to form other periodic grating patterns, such as those used in the comb electrodes disclosed by Miyawaki et al. '750, Byer et al. '221 and Kanarian et al. '068, which may be formed either by etching or lift off techniques with a reasonable expectation of forming high quality patterns based upon the pitches described in the claims.

11 The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

WO99/15933 teaches the use of near field imaging with bilayer resists. (14/29)

12 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-872-9309 for regular communications and 703-872-9309 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Martin J Angebranndt
Primary Examiner
Art Unit 1756

October 14, 2004